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Groundwater Influences on the Logan River Watershed

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Introduction

Understanding the relationship between groundwater and surface water is key to water management. Within the Logan River watershed, it has been estimated that groundwater travels 7.2 miles in 8 to 31 days; this is attributed to the karst geology present within the watershed. Because of short travel times, groundwater is potentially a highly variable source of water within the watershed. Drinking water for Logan City and secondary water for northern Cache Valley are obtained from Dewitt Springs and the Logan River, respectively. Understanding the role of groundwater on surface water is key to managing the watershed as a sustainable water source. A simple flow balance over portions of 2015-2016 within the Logan River watershed provides a first cut understanding of groundwater influences on surface water over time and space.

Methods

- Five sub-reaches spanning the Logan River watershed were established (Figure 1).
- Continuous flow data at 16 significant tributaries, diversions, and main-stem sites were collected (Figure 2,3).
- The daily flow average at each site was calculated.
- The groundwater discharge/recharge was determined in each sub-reach using a flow balance (Figure 4).

Results

- Flows were steady from August to March and peaked with snowmelt in spring (Figure 5).
- Flows increased moving down the watershed.
- Consistent groundwater discharge to the river was observed in sub-reaches **a**, **b**, **c**, and **e** (Figure 6).
- Significant groundwater recharge occurred across the bench area in sub-reach **d**.

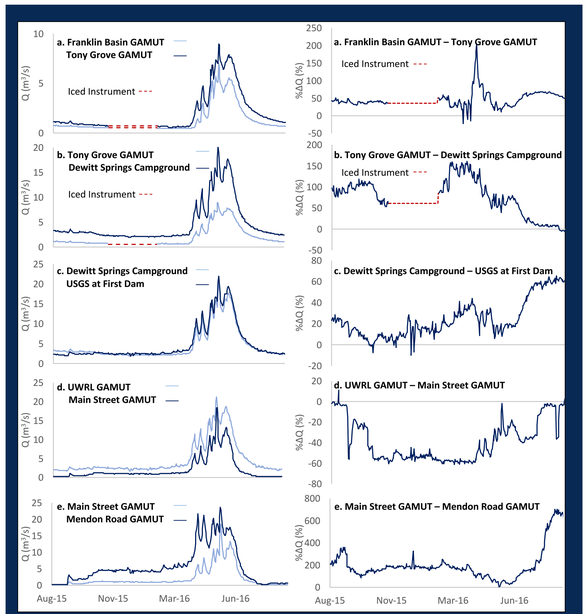

Figure 5: (left) Sub-reach daily flow average.
Figure 6: (right) Percent groundwater exchange by sub-reach.

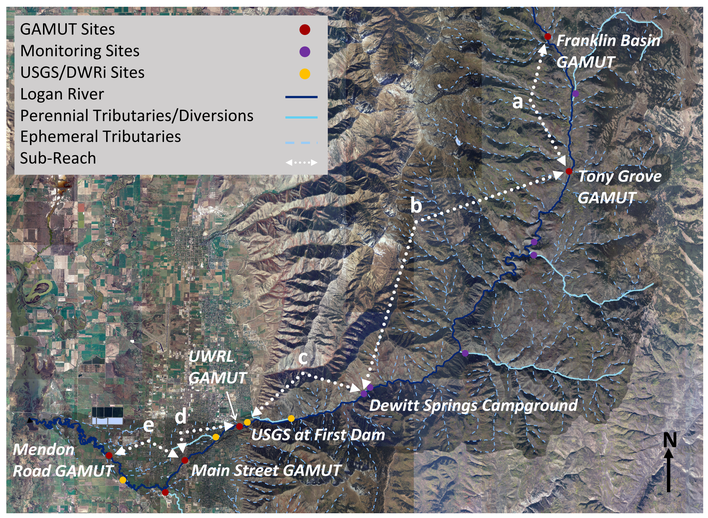

Figure 1: Logan River watershed and sampling sites

Figure 2: Flow measurement

Figure 3: Flow monitoring site

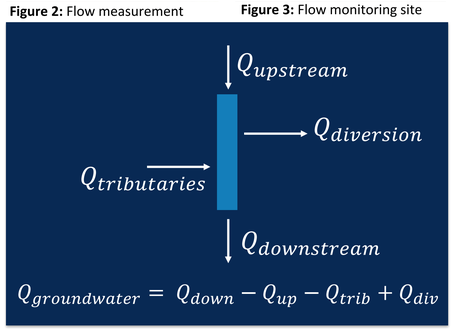

Figure 4: Flow balance representation

Discussion

These results indicate that the Logan River watershed is heavily influenced by groundwater. Climate change will affect the availability of shallow and deep groundwater over time. Future work should focus on quantifying deep and shallow groundwater flowpath contributions. Understanding these flowpaths is critical to maintaining the Logan River watershed as a sustainable drinking and secondary water source.

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